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CONNECTION ELEMENT

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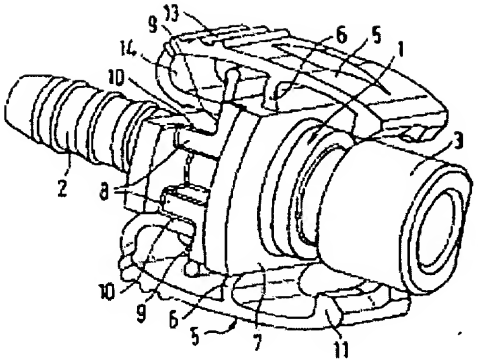

(57) **Abstract:** Disclosed is a joining element that is part of a fast connecting unit for hydraulic or pneumatic connecting conduits and comprises a tubular basic member (1), onto which two diametrically opposed, laterally spaced-apart two-legged snapping elements (5) are formed. Said snapping elements (5) are connected to the outer wall of the basic member (1) at the swaying point thereof while the free ends of the forward-facing legs thereof are provided with inward-directed hooks (11) which can grip from behind a catching element (12) (undercut) located on the outer wall of a counterpart (4) of the fast connecting unit when the connection is established. The rearward-facing legs of the snapping elements (5) are embodied as spring-type legs (13), the free ends of which are bent back in an inward direction such that a gap (a) remains between said ends and a respective opposite contact area. Said gap (a) limits the swaying movement of the spring-type legs (13) towards the basic member (1) to an extent that corresponds to the movement of expansion of the front legs of the snapping elements (5), which is required to disengage said hooks (11) from the catching element (12) of the counterpart (4), said front legs supporting the hooks (11). In addition, the restoring force of the snapping elements (5) is improved and the connection is secured against being accidentally released if the end of the spring-type legs (13) is bent so as to form a loop (14).

Specification

The invention relates to a connection element as part of a rapid connection unit for hydraulic or pneumatic connection lines with a tubular base body on which two two-armed snap elements are formed that are diametrically opposite one another, laterally spaced and connected at their rocking point by an elastic connection web to the outer wall of the base body and comprise inwardly directed hooks on the free ends of their forwardly facing arms that can reach behind a catch element (undercut) on the outer wall of a counterpiece of the rapid connection unit during establishment of the connection.

DE 41 18 463 A1 teaches such a connection element. The snap elements, extending substantially parallel to the outer wall of the tubular base body are connected at their rocking point by a curved, elastically deformable web to this outer wall. Said inwardly directed hook is formed on the free end of the front arm of each snap element and the particular second arm extends in a straight line to the rear at a radial spacing from the base body. In order to

* [Editor's note: page 2 of patent bibliographic information was not provided for translation.]

establish a connection, the connection element is inserted by the front end of its base body into the tubular connection part of a counterpiece where it makes a sealing contact in a known manner. The hooks snap on the front ends of the snap elements behind an undercut formed in the outer wall of the counterpiece, which secures the connection against loosening in an unintended manner. In order to loosen the connection, a radial pressure is exerted on the free ends of the backwardly extending second arms of the snap elements, as result of which the connection webs between the snap elements and the base body act as an articulation and the hooks are loosened from their engagement so that the connection element can be withdrawn from the counterpiece.

It turned out that this connection element has the disadvantage that permanent deformations and even breaks can occur on the connection webs and the backwardly extending arms of the snap elements when the latter are compressed in the direction of the base body in order to loosen the connection. The return function for the snap elements into their base position is exerted only by the connection webs and is not reliable. It also turned out that if pressure, caused, e.g., by the operation, is exerted on the connection element or also if it is pulled with an appropriate force, the hooks can loosen in an unintended manner from their engagement on the counterpiece.

The invention has the problem of creating a connection element of the initially cited type in which a reliable return of the snap elements into their base position is ensured after a loosening process on the connection and a permanent deformation or even a breaking of these snap elements as a consequence of their proper manipulation is reliably avoided. Moreover, greater safety against an unintended loosening of the connection should be achieved.

The invention achieves this in that the backwardly facing arms of the snap elements are designed as spring arms whose free ends are bent back and inward in such a manner that a gap is present between these ends and an opposite contact surface by which gap the rocking movement of the spring arms in the direction of the base body is limited to the degree corresponding to the spreading movement of the front arms of the snap elements carrying the hooks, which spreading movement is necessary for loosening the engagement of the hooks of the catch element of the counterpiece. The fact that the possible movement of the snap elements is limited to the functionally necessary degree in this manner counteracts a permanent deformation of the snap elements. The bent ends of the spring arms impart an effective return force to the snap elements.

According to an embodiment of the invention, the spring arms are first bent back on their end sections slightly concavely outward and then once in the direction of the base body. The gap limiting the rocking movement is present between the free end of the spring arms and the base body.

According to another, preferred embodiment of the invention, the spring arms are bent back inwards twice on their end section so that an open eyelet is formed with said gap

between the free end of the open eyelet and the inner surface of the particular spring arm and with a rounding that maintains another gap to the outer wall of the base body. During a rocking movement of the spring arms in the direction of the base body, at first the gap between the outer wall of the base body and the rounding is closed and in a second stage the gap between the free end of the eyelet and the inner surface of the spring arm is closed. The return force for the snap elements is increased even more by the formation of the resiliently deformable eyelet on the end of the spring arms so that the return of the snap elements into their initial position after each actuation is ensured.

According to an embodiment of the invention, level contact surfaces for the ends of the spring arms are formed on the base body and run diametrically opposed to each other in the direction of the central axis.

According to the preferred embodiment, level contact surfaces running diametrically opposed to each other in the direction of the central axis and for the rounding of the particular eyelet facing the base body and for the eyelet section also directed towards the base body as well as stop surfaces standing vertically to these contact surfaces and for the end section of the particular eyelet directed towards the inner surface of the spring arms are formed on the base body. The striking of the end sections of the eyelets directed towards the inner surface of the spring arms against the stop surfaces standing vertically to the central axis prevents loosening of the hooks of the snap elements, e.g., under pressure, from their engagement on the counterpiece in an unintended manner.

The invention is described in detail by way of example in the following using the attached drawings.

Figure 1 shows a perspective view of a first preferred embodiment of a connection element in accordance with the invention.

Figure 2 shows a lateral view of the connection element according to Figure 1 and of its counterpiece in the still loosened state.

Figure 3 shows the lateral view of Figure 2 with an established connection between the connection element and the counterpiece.

Figure 4 shows the lateral view according to Figure 3 when pressure, e.g., caused by operation, is exerted on the established connection.

Figure 5 shows the lateral view according to Figure 3 in a loosened position of the connection element.

Figure 6 shows the lateral view of a second embodiment of a connection element in accordance with the invention.

Figure 1 shows a connection element with tubular base body 1 that merges on its one rear end into connection piece 2 for a pressure-agent line, e.g., a hose, and comprises cylindrical section 3 on its front end with which section the connection element can be pushed in order to establish a connection into correspondingly formed counterpiece 4 (see

Figure 2 and Figures 4 to 6) where it makes a sealing contact in a known manner. Diametrically opposed snap elements 5 are arranged on the side of base body 1. They are designed in the manner of a two-armed lever and connected at their rocking point by radially projecting connection web 6 to base body 1. Connection web 6 preferably projects from stop plate 7 protruding on base body 1 which plate can come to rest during assembly on counterpiece 4 (see Figure 3). Two diametrically opposed right-angle formed parts 8 follow stop plate 7 in the direction of connection piece 2 with one angle arm of the formed parts 8 running vertically to the axial direction and offering level stop surface 9 while the other angle arm runs in the axial direction and offers level contact surface 10 (see below). Stop plate 7 and formed parts 8 are preferably designed in one piece with base body 1. Inwardly directed hook 11 is formed on the free end of the one lever arm of both snap elements 5 facing counterpiece 4. These hooks 11 slide during the insertion of the connection element into counterpiece 4 along its circumferential surface and finally reach behind an undercut or catch element 12 on the circumference of counterpiece 4 (see Figure 3). The backwardly directed lever arm of both snap elements 5 is designed as spring arm 13. For this, its end is inwardly bent back twice and forms a type of open, elastically deformable eyelet 14 between whose free end and the inner surface of spring arm 13 gap a is present in normal position. Another gap b is present in the start position between inwardly facing rounding 15 of eyelet 14 and between horizontal contact surface 10 of formed part 8.

When the connection element according to Figure 2 is moved in the direction of arrow P into counterpiece 4, the arrangement finally assumes the position according to Figure 3. Hooks 11 of snap elements 5 reach behind catch element 12 on the outer circumference of counterpiece 4 and stop plate 7 rests with its front surface on the front surface of counterpiece 4 and/or on sealing means 16 provided there, and sealing ring 17 arranged in a groove of cylindrical section 3 rests in a sealing manner in the inner wall of counterpiece 4 and the connection is established. During this procedure the arms of snap element 5 facing counterpiece 4 were slightly spread apart and during the reaching of hooks 11 behind the catch element or elements 12 they do not return completely into their initial position and hooks 11 are therefore under a slight pre-tension so that an unintentional drawing off of the connection element is counteracted. Moreover, spring arms 13 have moved in the opposite direction during the rocking movement of snap elements 5 around connection web 6 functioning as a hinge so that inner rounding 15 of eyelet 14 now rests on contact surface 10 of formed part 8 with a slight tension so that a return force becomes active and the tension with which hooks 11 are pressed against the circumferential surface of counterpiece 4 is increased and the connection becomes more secure.

A small gap is present between the end section of eyelets 14 directed towards the inner surface of spring arms 13 and between stop surfaces 9 of formed parts 8 running vertically to the central axis (see Figure 3). If the arrangement comes under the action of